Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

1. (currently amended) A method for down-converting and de-spreading a received spread spectrum signal, comprising the steps of:

(1) receiving the spread spectrum signal having a center frequency that is above baseband; and

(2) sampling the received spread spectrum signal according to a control signal resulting in a de-spread baseband signal, wherein said control signal includes a spreading code corresponding to said received spread spectrum signal, said control signal having a center frequency that is selected so as to down-convert said received spread spectrum signal to baseband during said sampling step.

2. (original) The method of claim 1, wherein step (2) comprises the steps of:

(a) sampling the received spread spectrum signal at a rate that is a sub-harmonic of the received spread spectrum signal, resulting in under-samples; and

(b) storing said undersamples in a storage module, wherein successive undersamples form the de-spread baseband signal.

3. (original) The method of claim 2, wherein step (a) comprises the step of operating a switch according to said control signal.

4. (original) The method of claim 2, wherein step (b) comprises the step of charging a capacitor with said undersamples.

5-7. (cancelled)

8. (original) The method of claim 1, wherein said spreading code is a PN code.

9. (currently amended) A method for down-converting and de-spreading a received spread spectrum signal, comprising:

(1) receiving the spread spectrum signal; and

(2) sampling the received spread spectrum signal according to a control signal resulting in a de-spread baseband signal, wherein said control signal includes a spreading code corresponding to said received spread spectrum signal;

~~The method of claim 1,~~ wherein said step (2) comprises ~~the steps of:~~

(a) generating an oscillating signal;

(b) generating a spreading code;

(c) modulating said oscillating signal according to said spreading code, resulting in a spread oscillating signal; and

(d) triggering a pulse generator according to said spread oscillating signal to generate said control signal~~, wherein pulses from said pulse generator have a pulse width established to improve energy transfer to the de-spread baseband signal~~.

10-12. (cancelled)

13. (currently amended) An apparatus for down-converting and de-spreading a spread spectrum signal, comprising:

(1) a spreading code generator ~~for generating~~ to generate a spreading-code; and

(2) a ~~universal~~ frequency down-conversion ~~(UFD)~~ module coupled to said spreading code generator, comprising:

(a) a switch controlled by a control signal to undersample said spread spectrum signal, resulting in an undersample, wherein said control signal carries said spreading-code and has a center frequency determined so as to down-convert said spread spectrum signal to a lower frequency signal; and

(b) a storage device coupled to said switch to store said undersample, wherein successive under-samples form said de-spread baseband signal.

14. (currently amended) An apparatus for down-converting and de-spreading a spread spectrum signal, comprising:

(1) a spreading code generator to generate a spreading-code; and

(2) a frequency down-conversion module coupled to said spreading code generator, including

(a) a switch controlled by a control signal to undersample said spread spectrum signal, resulting in an undersample, wherein said control signal carries said spreading-code; and

(b) a storage device coupled to said switch to store said undersample, wherein successive under-samples form said de-spread baseband signal; and

~~The apparatus of claim 13, further comprising:~~

(3) a pulse generator coupled between said spreading code generator and said ~~UFD~~ frequency down-conversion module, comprising a means for generating said control signal having a plurality of pulses based on said spreading code.

15. (previously presented) The apparatus of claim 13, wherein said storage device is one of a capacitor and an inductor.

16. (currently amended) An apparatus for down-converting and de-spreading a spread spectrum signal, comprising:

(1) an oscillator for generating an oscillating signal;

(2) a spreading code generator for generating a spreading code;

(3) a modulator coupled to said oscillator and said spreading code generator for generating a spread oscillating signal using said oscillating signal and said spreading code;

(4) a pulse generator coupled to said modulator, for generating a control signal using said spread oscillating signal; and

(5) a ~~universal~~ frequency translation module coupled to said pulse generator, comprising:

(a) a switch controlled by said control signal to undersample said spread spectrum signal; and

(b) a storage device coupled to said switch to store undersamples from step (5a), wherein successive under-samples form a de-spread baseband signal.

17. (new) The method of claim 1, wherein said center frequency of said control signal is approximately equal to said center frequency of said received spread spectrum signal.

18. (new) The method of claim 1, wherein said center frequency of said control signal is approximately a sub-harmonic of said center frequency of said received spread spectrum signal.

19. (new) The method of claim 1, wherein said center frequency of said control signal is offset from a sub-harmonic of said center frequency of said received spread spectrum signal.

20. (new) The method of claim 1, wherein said step (2) comprises the steps of:

(a) generating an oscillating signal having said center frequency that is determined to down-convert said received spread spectrum signal to baseband during said sampling step;

(b) generating a spreading code; and

(c) modulating said oscillating signal according to said spreading code, resulting in a spread oscillating signal.

21. (new) A method for down-converting and de-spreading a received spread spectrum signal, comprising the steps of:

(1) receiving the spread spectrum signal having a center frequency that is above baseband;

(2) generating a control signal having a center frequency that is selected to down-convert said received spread spectrum signal to baseband, and said control signal also including a spreading code corresponding to said received spread spectrum signal; and

(3) sampling the received spread spectrum signal according to said control signal so as to down-convert and de-spread said spread spectrum signal.

22. (new) The method of claim 21, wherein said sampling step includes the step of sampling the received spread spectrum signal according to said control signal so as to simultaneously down-convert and de-spread said spread spectrum signal.